

Leopold Center research leads the way: Answering producers' cover crop questions

By LAURA MILLER, Newsletter editor

Two words have resonated at farm events over the past year: cover crops. At fall field days, you can watch a plane aerial seed cover crops. In the spring, you can walk fields where cover crops show the only hint of green. You can talk to neighbors who've been using them, read how they work in other regions, even apply for cost-share funds to try them.

But none of these conversations, demonstrations and information sessions tell you what you really want to know: How can you make cover crops work in your crop production system?

The Leopold Center is funding five current research projects designed to answer producer questions about cover crops and fill in the knowledge gaps on management variability. What species do best in your climate and soils? What's the planting window and how does it affect yield? How do you terminate the cover crop and when? How does weather affect cover crop growth and will it make a difference to your cash crop?

We checked in with several researchers to find out what questions they've been able to answer.

COVER CROPS (continued on page 6)

Spencer Award winners lead in sustainability

Two Iowans with leadership achievements in their careers have been selected to receive the 2014 Spencer Award for Sustainable Agriculture. They are southeast Iowa farmer Steve Berger and Leigh Adcock, the outgoing director of the Iowa-based grassroots Women, Food and Agriculture Network.

One of the largest and longest-running awards of its kind in Iowa, the Spencer Award is administered by the Leopold Center. It recognizes farmers, teachers and researchers who have made significant contributions to the environmental and economic stability of Iowa's family farms.

Leopold Center Director Mark Rasmussen said he was pleased to be honoring two people, thanks to an extraordinary pool of nominations this year and the donor's willingness to support two awards. The Spencer Award was created

by the family of Norman and Margaretha Spencer, who farmed for many years near Sioux City, and carries a \$1,000 cash prize.

"The Spencers believed that it is the obligation of each generation to leave the world a healthier and better place for the next generation, and the work done by our 2014 recipients certainly mirrors those beliefs," Rasmussen said.

Berger operates a corn-soybean and farrow-to-finish swine operation near Wellman with his father, Dennis. The Bergers have no-tilled for 35 years, built 14 miles of contour terraces and use cereal rye cover crops on all their acres.

Over the past 20 years, Berger has participated in 24 field trials on his farm, conducted with researchers from Iowa State University, the Iowa Soybean Association, Pioneer Hi-Bred and Monsanto. Topics have been as diverse

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LEOPOLD CENTER

LEOPOLD LETTER MISSION

The mission of the *Leopold Letter* is to inform diverse audiences about Leopold Center programs and activities; to encourage increased interest in and use of sustainable farming practices and market opportunities for sustainable products; and to stimulate public discussion about sustainable agriculture in Iowa and the nation.

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The Leopold Center for Sustainable Agriculture seeks to identify and reduce adverse socioeconomic and environmental impacts of farming practices, develop profitable farming systems that conserve natural resources, and create educational programs with the ISU Extension Service. It was founded by the 1987 Iowa Groundwater Protection Act. The *Leopold Letter* is available free from the Leopold Center at 209 Curtiss Hall, Iowa State University, Ames, Iowa 50011-1050; (515) 294-3711.



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News & Notes

The Leopold Center received 55 submissions to the Summer 2014 Request for Pre-proposals, which will fund new projects to begin in 2015. Of those submissions, 18 fell under the Ecology Initiative, 16 in the Cross-cutting Initiative, 15 in the Marketing and Food Systems Initiative and six in the Policy Initiative.

Following review by advisory board and staff, 34 preproposals will move to the next round and investigators have been invited to submit more detailed proposals by October 28 for technical and scientific review.

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A new 50-page publication, *Machinery Sharing Manual for Fruit and Vegetable Growers*, discusses operational and organizational issues related to sharing

specialized farm machinery for fruit and vegetable production, including sample sharing agreements and worksheets. The manual is based on case studies conducted as part of a Leopold Center competitive grant project. Find by title at: www.leopold.iastate.edu/pubs/alpha.

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More than 330 people attended events in August featuring nationally known grazing consultant Jim Gerrish. Handouts and key points from the five workshops and eight pasture walks also are available from the Iowa Beef Center, which organized the series with support from the Leopold Center and a number of other local partners. Get more details at:

www.leopold.iastate.edu/gerrish-grazing.

New staff to support marketing and communications

Stop by our offices in Curtiss Hall, and you will see three new faces around the Leopold Center. Alice

Topaloff is our new program assistant with the Marketing and Food Systems Initiative. She will help develop and administer the Local Food and Farm program, the Iowa Food System Working Group, and related research projects. In addition, we welcome two new graduate students to the team: Ahna Kruzic, who also joins the marketing initiative, and Stefanie Trout, who is our new communications research assistant.

Alice Topaloff grew up in France, where she received her Bachelor's and Master's degrees from AgroParisTech. Her research was international in scope, taking her from the Caribbean to Brazil and on to the United States. As a Leopold Center intern, she completed a historical case study of farm operations in northeast Iowa, which was the subject of her Master's thesis. (Find the report, *Diversity of Conventional Farming in Northeast Iowa: Why Do Farmers Farm the Way They Do?*, on our Pubs & Papers page, www.leopold.iastate.edu/pubs.) Alice fell in love with Iowa and returned to become a part of the local food

movement efforts of the Leopold Center and ISU Extension and Outreach.

Ahna Kruzic hails from Albia, Iowa, in Monroe County. She received her Bachelor's in sociology and gender studies at Iowa State and is now a first-year Master's student co-majoring in Sustainable Agriculture and Sociology. Her research explores the intersections of sustainable agriculture, food, and rural sociology, which will inform the development of local food systems resources for extension educators and their communities. Ahna has taught English in China, supported a community organizing nonprofit in Iowa, and worked on a Colombian farm.

Originally from Michigan, Stefanie Trout studied environment and history at the University of Michigan before moving to Indianapolis, where she received her Master's degree in teaching from Marian University and taught English and science in secondary schools. She now studies Creative Writing and Environment in the Master of Fine Arts program at Iowa State, where she also coordinates the Everett Casey Nature Center and Reserve and

participates in both AgArts and a local bee club. Stefanie co-edited the recently released *Prairie Gold: An Anthology of the American Heartland* (Ice Cube Press).



Alice Topaloff



Ahna Kruzic



Stefanie Trout

Conversations

WITH DIRECTOR MARK RASMUSSEN



Voluntary compulsion: Behavior for our times

We are all presented with an array of (sometimes painful) choices as we go about our daily lives. Modern agriculture particularly is no exception.

You all know what I am talking about; the decision whether to do something that we may not want to do. In some cases it means we must embark on some action before we are forced to do so. At other times, it involves making a cost/benefit kind of decision where the scales seem pretty evenly balanced.

Our exposure to this process begins when we are very young and our parents are the prime “suggesting” influence. We “decide” to make the bed, wipe our shoes, wash our hands, or do other chores voluntarily before being reminded of the less-than-desirable task. Fast forward into adulthood and the compelling influence likely will be someone other than your parents. Or, if you go into business for yourself, as an entrepreneur speaking at a seminar pointed out, running your own business gives you the right to push yourself well beyond the point allowed of any employer.

For those in agriculture and farming, there are many “suggesting” influences, including consumers, agribusinesses, environmental groups, fellow farmers, neighbors, relatives, family, etc. The decisions to be made also are many and the way is not always crystal clear. I knew a fellow who painted the front side of a barn, the side which faced the road. He left the back side unpainted until a new road was installed, and the back side of the barn and his deceit were exposed. He then proceeded to paint the whole barn.

We face all sorts of decisions in terms of agricultural production methods and the pressure to meet the expectations of external forces continues to grow. In the livestock industry, there are many issues such as antibiotic use, castration, gestation crates and battery cages where difficult decisions have to be weighed and balanced against the outcomes. In crop production, the decisions are just as difficult and farmers must evaluate the value of an array of potential conservation practices ranging from cover crops to crop rotations to wetlands.

These are not easy choices to make because cost and economics usually are a major factor in the decision-making process. (Do we pay the cost to paint the whole barn or just color the side visible to the public?) Americans cherish the right to make these personal decisions and that compounds our dilemma. Do I move on something proactively, which may entail costs and make me less competitive than my neighbors in the farming business? Or do I wait to see if the situation becomes serious enough that I must act? In some cases, an entire industry will take a wait-and-see attitude,

but meanwhile the pressure may be building on other fronts. In the worst case scenario, which is very common in U.S. history, we wait until a crisis occurs and mandatory regulation soon follows. Many then regret not having taken steps earlier to avoid the precipitating crisis.

A big issue in Iowa agriculture right now is the implementation of the Nutrient Reduction Strategy, the statewide effort to deal with the loss of soil and nutrients that leave the state and flow toward the Gulf of Mexico. Prominent farm spokespersons have stated that “doing nothing is not an option” as they encourage farmers to implement the practices needed to build soil organic matter and protect the land from erosion. But a farmer’s decision is made difficult by the large number of options available and trying to figure out which will fit most readily into their operation.

As many on the farm know, making too many changes too quickly may jeopardize the financial viability of one’s operation. This is especially true when the learning curve is steep and the first attempt may yield results that are less than ideal. Good intentions are fine, but as we all know they don’t make payments on the operating loan.

There also is the issue of time and tenancy associated with carrying out the Nutrient Reduction Strategy. Some practices are good for only a year and don’t cost too much to implement. Others will last for many years and require considerable investment. So, any decisions must be made from the perspective of time and from the differing responsibilities of being a tenant or landowner.

There are few good—or easy—answers. It really does come down to the personal situation of the individual farm operator or landowner. It takes time to implement large changes, alter one’s way of thinking and to do it on the fly in an ongoing operation. I liken it to trying to repair a tractor while it is still moving across the field.

These are difficult choices to make and I wish everyone good luck sorting through the pros and cons of any given decision. Whatever is decided, rest assured there will be consequences; the good, the bad and the downright uncomfortable. Let’s hope that the good outcomes outnumber the bad in the final accounting.

Mark Rasmussen

SPENCER AWARD WINNERS LEAD IN SUSTAINABILITY

SPENCER (continued from page 1)

as nutrient uptake, fertilizer regimes for no-till systems, understanding phosphorus runoff in surface and tile water, and manure runoff and leaching characteristics of poultry or swine manure.

His nomination, prepared by Jody Bailey, coordinator of the English River Watershed where Berger farms, also lists 66 field days, workshops and other events where he has either presented or hosted in his role as a proponent for no-till and cover crops.

Bailey wrote: "When we asked Steve why learning and teaching about these sustainable farming practices is so important to him, he replied: 'Spencer and Leopold believe that a farmer doesn't really own his land, it belongs to God, and the farmer is the land's steward of his generation. Leopold's land ethic examines what is ethically and esthetically right, as well as what is economically expedient. Spencer approached his farm as a business, a science, and an art,' much the same way we do on our own farm."

Berger has been featured on Iowa Public Radio, in numerous farm newspapers and magazines including the cover of *Progressive Farmer* in a 2010 story about cover crops. Most recently he received the Environmental Leader award from the Iowa Soybean Association in Spring 2014.

"Berger is a farm-level ambassador who believes that farmers must be shown through example that conservation practices can work effectively and economically so more of them will embrace conservation voluntarily," Bailey wrote in the nomination. "He understands the challenges in today's farming environment ...but he knows that it is not only possible, but very rewarding."

Adcock of Ames served as WFAN's executive director since 2008 and retired from the position August 2014. She was nominated by the group's board of directors.

"Her collaborative leadership and innovative approach to expanding support and resources has greatly benefitted agricultural women in Iowa; however, these benefits extend well beyond women," wrote Angie Carter, on behalf of the board. "Increasing the visibility and raising the voice of agricultural women creates new opportunities for Iowa's farming families, strengthens the social fabric and local economies of our rural communities, and improves the ecological health of the land for future generations."

Three WFAN educational programs have gained widespread recognition and support. The Women Caring for the Land program works with women farmland



Southeast Iowa farmer Steve Berger
(photo by Lynn Betts)



Leigh Adcock, outgoing director of the Iowa-based WFAN

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More about the Spencer Award and past winners:
www.leopold.iastate.edu/spencer-award

owners and conservation professional staff, reaching more than 1,800 women in Iowa and seven states since 2009. Harvesting Our Potential provides on- and off-farm mentorships, business training and structured networking opportunities to aspiring and beginning women farmers in Iowa and Nebraska. Plate to Politics is an emerging national leadership development program, providing tools and training to women engaged in advocacy on behalf of healthy food and farming.

During Adcock's tenure, WFAN membership grew from 300 to over 5,000 nationwide. Carter said Adcock was able to start new groups in California, Minnesota and Wisconsin while maintaining WFAN's Iowa roots.

"Her leadership of WFAN has cultivated an increase in diversity, inclusivity and sustainability in Iowa's agricultural landscape," Carter wrote. "Leigh's passion, dedication and success in promoting sustainable agriculture and in creating a network for agricultural women has directly benefitted Iowa's agricultural women, their families, their communities, and subsequent generations."

The Spencer Award presentation is being scheduled as part of the annual Iowa Water Conference, to be held March 2-3, 2015, at ISU in Ames.

Updates to organic website include latest findings

More than 100 new entries have been added to the Leopold Center's "Scientific Findings About Organic Agriculture" website, which summarizes peer-reviewed, scientific articles related to a comparison or specific trait of food grown using organic practices. The 2014 updates have more than doubled the number of featured articles, making the resource more useful than ever.

The website began in 2006 as a special project under the leadership of Jerry DeWitt, who was then director of the Leopold Center. The website was launched

two years later with findings from more than 70 scholarly articles. Since then, the website has undergone a redesign and now boasts summaries of nearly 300 articles.

Research findings are listed on the website by topic. The categories include animal health and welfare; comparisons between organic and conventional systems; fruits, vegetables and niche plant products; meat; grains, oilseeds, and nuts; dairy; poultry, eggs, fish, and niche meats; consumer perspectives; and environmental impacts.

The recent additions are all summaries of articles that have been published since May

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Scientific Findings About Organic Agriculture:
www.organicag.org

2014, so the spike in the quantity of articles listed on the website reflects an increase in the number of scientific studies dealing specifically with organic agriculture.

To suggest an article for inclusion on this website, email leocenter@iastate.edu and include the complete reference citation.



Is optimization the answer?

Humans are great optimizers. We look at everything around us, whether a cow, a house, or a share portfolio and ask ourselves how we can manage it to get the best return.

—Walker and Salt, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*

Our industrial economy today is driven by a single mandate: maximum, efficient production for short-term economic return. This is how we define success, whether you are a manufacturer, a retailer or a farmer. Furthermore, the most effective ways to achieve that goal are to *specialize* (diverse systems tend to require more supervision), *simplify management* (complex systems tend to be more difficult to control), and achieve *economies of scale* (larger systems are believed to always be more efficient). To succeed in our economic system, you also must determine which inputs will yield maximum outputs and how to externalize as many unintended costs as possible.

The term that is increasingly used to describe this “successful” business strategy is “optimization.” Recently the term has gone viral in agricultural literature.

This singular goal stems from two assumptions: a) that the natural resources and sinks in nature, required to sustain the inputs and externalize the wastes, always will be there; and b) that the control management required to achieve the goal always will be successful.

Resilience thinkers and ecological economists are among the contemporary thought leaders who have begun to question these assumptions.

Resilience thinkers see that our world is not stable but constantly goes through a series of complex adaptive cycles, and that disrupting surprises always are likely to happen. Consequently, in the interest of successful management, it makes sense to anticipate such changes and design systems that are more likely to be successful in such a complex world. If one assumes that “things will happen in much the same way tomorrow as they did yesterday,” then one is not likely to be a successful manager (Walker and Salt 2006).

Ecological economists point out that unlimited natural resources and sinks on a limited planet are fictional. Consequently, we need to redesign our economic systems so that natural capital is not depleted faster than nature can restore it, and our wastes are no longer externalized faster than nature’s capacity to recycle them. In other words, we need to move toward a “steady state economy” if we truly want to be sustainable (Daly 1996).

Likewise, resilience thinkers suggest that believing we can hold any system in a “sustainable optimal state” also is fiction. In fact the assumption that we can manage any system through “command and control” is a flawed belief, since it is simply not the way the world actually works. As they put it: “Yes, we can regulate portions of a system—and increase that portion’s return

over the short run—but we can’t do this in isolation from the rest of the system. When some part is held constant, the system adapts around our changes, and frequently loses resilience in the process. While we can hold parts of the system in a certain condition, the broader system is beyond our command.” Farmers certainly have learned this lesson with respect to pest management in recent years.

All of this suggests that our preoccupation with “optimizing” current production arrangements cannot succeed indefinitely.

Furthermore, as resilience thinkers also point out, we humans are “great short-term optimizers” but we are “not so good over long-term timeframes.” We have convinced ourselves that somehow we are divorced from the system yet still in control, when, in fact, we are part of the system.

This observation points to a deeply entrenched *culture* problem, which we need to address if we truly are to achieve sustainability. “Resilience thinking is all about seeing the system—the social-ecological system that we’re all a part of—as one interlinked system” (Walker and Salt 2006). This is the cultural problem that Aldo Leopold also referred to, when he reminded us that we are not the “conquerors” of the rest of the biotic community, we are simply “plain members and citizens.”

This approach infers that our path toward a sustainable future should not rely on “optimization” but rather on “adaptation.” How do we design our food and farming systems to adapt to the systemic changes in our future—changes in energy, water, land, climate, etc.—so that we can sustain the food and water resources needed to maintain the health of the biotic community (including humans). As Leopold wrote, “health is the capacity of the land for self-renewal” (Leopold 1949). Enhancing that capacity remains our most important mission.

Resilience Thinking

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ANSWERING PRODUCERS' COVER CROP QUESTIONS

COVER CROPS (continued from page 1)

Modeling long-term impacts

One way to get answers is by using computer simulation, or models that represent the dynamics of agricultural fields. Observation and measurements from existing research plots can be part of a model to test the accuracy of predictions generated by the model. Different variables—planting date, rainfall, land slope and soil properties—are used to set up potential scenarios to predict factors such as crop yield, erosion, nitrate loss and even changes in the soil.

Fernando Miguez, assistant professor of crop production and physiology who operates the Iowa State Agroecosystem Modeling Lab, is using this approach to explore long-term impacts of cover crops on the health of the soil, soil water dynamics and erosion, and crop yields. In light of high-intensity rainfall events in recent years, as well as extended periods without rainfall, these predictions could be very helpful for Iowa farmers as they adapt to changing climate conditions and increasing pressure to improve soil and water quality.

The modeling team had a head start with access to 10 years of data from USDA research plots in Boone County that included a winter rye cover crop treatment. They also have collected three years of new measurements (including soil organic matter, soil water content, plant growth/biomass) from the central Iowa plots and four other regions of the state. Researchers use the 10+ years of data in the model, which simulates outcomes that can be averaged and translated into real-life expectations.

The simulations have shown:

- By planting cover crops three weeks earlier in the fall (early September compared to late September), cover crop growth more than doubled.
- Early cover crop planting (around September 1, done by aerial seeding before the cash crop is harvested) had practically no impact on corn and soybean yields.
- Across five sites in Iowa, cover crops increased the amount of topsoil carbon by 4 to 9 percent and reduced erosion by 14 to 32 percent (depending on planting date, soil type and field slope).

Andrea Basche, an ISU doctoral candidate who works with the team, said another surprising difference they've observed is how the use of cover crops over 13 years has increased the soil's potential

to store plant-available water. While the preliminary result is encouraging, it does not always translate into increases in yields in the cover crop plots.

Rotation effect

Tom Kaspar, a plant scientist at the USDA's National Laboratory for Agriculture and the Environment in Ames, is in the last year of work on another Leopold Center-supported research project. He's investigating why winter rye occasionally causes a yield decrease in the following year's corn crop. The effect does not occur every year or in every field, and sometimes does not occur even when corn is planted right after rye termination.

His hypothesis is that rye can act as a host for common soil pathogens that carry over in the soil and dead roots. These pathogens may infect the newly planted corn when conditions are right, that is, cold and wet during the early part of the season. So far, seed fungicides do not appear to be the solution.

"We consistently can cause rye to increase infection of corn roots and reduce corn growth in a controlled environment where we keep conditions cold and wet,



Graduate student Andrea Basche (left) and technician Wendy Borja tie up a plant sample from ISU research plots northwest of Ames. They are measuring how cover crops affect plant growth.

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WEB EXTRA
Updates on two other projects:
www.leopold.iastate.edu/fall-2014-cover-crops

but in the field it sometimes doesn't make any difference," he said. "When you terminate the rye earlier, lengthening the time between rye spraying and corn planting, the effect diminishes. We had suspected as much, because a common recommendation has been to wait 14 days after termination before planting corn."

Kaspar suspects that the 14-day recommendation in the planting guidelines may be more important for earlier rather than later corn planting.

On-farm trials

Sarah Carlson is the Midwest cover crops research coordinator at Practical Farmers of Iowa and a member of the Iowa Cover Crops Working Group. In tandem with Iowa Learning Farms, she conducted five years of cover crop trials with 10 Iowa farmers. They planted side-by-side strips of corn/soybean crops with a winter cereal rye cover crop, and strips using no cover crop, replicated at least two times. Iowa Learning Farms received a Leopold Center competitive grant in 2014 to collect an additional year of data at seven sites this fall and next spring (a positive experience during the first five years of the project resulted in three farmers adopting full use of cover crops).

Between 2009 and 2013, the use of cover crops seemed to have little effect on yield. In fact, some farmers saw higher yields and better soil quality, especially in soybean fields. Carlson said fall and spring field days on those farms have helped transfer management information to farmers interested in trying cover crops. She estimates that her team, and the field days, have reached about 5,000 people this year.

"We depend on farmers to spread the word about cover crops and how they successfully manage them," she said. "Their number one question is how to get it planted in the fall, and then what do they plant. We're evaluating whether mixes of different types of cover crops really make a difference if they're only in the ground four months of the growing season."

Horticulture prof explores cover crops for vegetable production

By ARLENE ENDERTON, Leopold Center program assistant

While everyone else was busy harvesting crops in September, Ajay Nair could hardly wait to plant cereal rye and hairy vetch seeds for his next experiment that he hopes will address a food safety concern in fresh melons.

Nair, an assistant professor in the ISU Department of Horticulture at Iowa State University, is exploring the potential of cover crops in vegetable production systems and how they can be used to improve food safety. For the past three years through an unrestricted estate gift, the Leopold Center has provided financial support for Nair and Joe Hannan, a horticulture field specialist for Iowa State University Extension and Outreach. Both positions were new, and Nair and Hannan used the funds to set up their research and education programs.

Nair's newest project is funded by a grant from the USDA's Sustainable Agriculture and Research Education (SARE) program. The project evaluates how cover crops might be used to help control *Listeria* in melons, which has been a major food safety concern.

"We will establish a cover crop in the fall and roll them in the spring [to terminate them]," he explains. "Before rolling, the soil will be inoculated with a non-pathogenic form of *Listeria*. This will be followed by planting a melon crop."

Nair will work with Angela Shaw from the ISU Department of Food Science and Human Nutrition, as well as colleagues at Michigan State University to test the hypothesis that a terminated cover crop can act as a barrier, and maybe even suppress *Listeria*, that can contaminate a growing melon crop.

This interdisciplinary research came about partially as a result of the network Nair connected through the Leopold Center. "I found a backbone of people," he says.

Nair joined the ISU faculty in 2011, after completing a doctoral degree in sustainable vegetable production at Michigan State University. He summarizes his doctoral research, "I focused on integrating cover crops into vegetable cropping systems and their effect on vegetable yield, quality and soil properties. I also did on-farm trials, which helped me become interested in Extension."

The Iowa State position was a natural fit. "There was a big push in the area of local food production and I could see a lot of growers getting into the business," he

said. Enthusiasm for vegetable production was high and growers of all sizes were experimenting with a variety of production practices. Nair also met with Leopold Center staff, including Craig Chase who leads the Marketing and Food Systems Initiative, to identify priority areas for his new program.

Today Nair's research focuses on several practices: cover crops, strip tillage, biochar, high tunnels and crop diversification. He received a Leopold Center competitive grant in 2014 to continue his research on cover crops as they related to soil health and nitrogen retention.

"Vegetable growers have the advantage of growing vegetables in different seasons with different maturity dates, which provide flexibility to incorporate cover crops," he said. "A vegetable grower might grow spring crops and when they're done there might be a 30- to 45-day window for a cover crop."

Nair has found that using cover crops in vegetable production systems can improve nutrient cycling and support beneficial microorganisms in the soil. The Leopold grant will expand the research to include both traditional (cereal rye) and non-traditional (oilseed radish, sorghum sudangrass, buckwheat) cover crops.

For the past two years, Nair has worked with growers doing on-farm trials with cover crops and gauging their effect on soil and crop yields. In one trial, they planted oilseed radish and yellow mustard, both summer cover crops, resulting in one farmer adding cover crops to his production system.

"He could see it growing and learn how to manage it and he was interested in improving his soil by adding organic matter," Nair said.

Strip tillage research naturally follows cover crops, he explained, because this type of tillage is one way to terminate a cover crop. Farmers growing cucurbits, such as pumpkins, can turn under a portion of the cover crop in strips, thus creating rows where pumpkins can be planted.

Nair's research on biochar flowed out of his interest in building and feeding the soil.

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Sustainable Vegetable Production Lab:
www.extension.iastate.edu/vegetablelab/

"Biochar is a high carbon material and a lot of people are using it, but not a lot of research has been done on it in vegetable crops," he says. His research measures the effects of adding biochar to the soil on nutrient cycling, nitrogen leaching, and the health of soil microorganisms.

Nair's work in high tunnels, which are passive solar greenhouses consisting of a hoop structure covered with plastic sheeting, is a direct result of demand from growers. Growers were interested in high tunnels when Nair was establishing his extension program, so he teamed with colleagues to provide hands-on high tunnel workshops. These workshops have allowed Nair to interact with farmers and mold his work to fit their needs.

Nair also has studied crops not traditionally grown in Iowa, such as sweet potatoes that often are thought of as a southern crop. The team has identified cultivars that do fairly well under Iowa growing conditions.

Once again, Nair is branching out, looking at non-traditional leafy greens. "I went to China last year and every meal had bok choy. I thought, 'We should grow this in Iowa.'" Shortly after, Nair started a cultivar trial of bok choy.



Ajay Nair shares results of his research growing crops in high tunnels during a field day in August at the ISU Hort Station north of Ames.

Leopold Center project helps Iowa prepare for ash tree pest

By GEETHA IYER, *Special to the Leopold Center*

Thanks to Leopold Center-funded research, social networks are in place to mitigate the emerald ash borer's destructive impact on Iowa forests.

Iowa State University scientists Jesse Randall, Tricia Knoot and John Tyndall led a project studying how to sustainably manage urban and rural forests given the threat of tree mortality from invasive pests, particularly the emerald ash borer (EAB). They spoke to Iowa's "EAB Readiness Team," an executive group composed of members of the state's various natural resource agencies. They also talked to community members involved in tree management, wood processing and related businesses.

The researchers analyzed how these various stakeholders exchange information, implement policies, and respond to the latest sites of beetle infestation. They also are producing various outreach and education resources to encourage proactive community responses to what is proving to be one of the most destructive forest pests in the United States.

EAB already was well-established in eastern Iowa when a statewide quarantine was announced in February 2014 to halt the movement of ash wood, which could potentially harbor beetles, larvae or eggs. Nonetheless, the confirmation of EAB in Boone and Story counties in August highlights the fact that protecting these commonly planted trees from the insect's damage

is an urgent problem requiring an adaptive response from multiple stakeholders with varied responsibilities and expertise.

"Adaptive management is a strategy involving cooperation and communication among diverse stakeholders," explains Tyndall, the social science specialist for the Leopold Center's cross-cutting grant project, funded in 2011. "Roles and responsibilities are clearly delineated to facilitate decision-making, but the organization also is flexible to change. Regular communication and learning is

encouraged so that responses to problems are constantly evolving and adapting to new information."

Adaptation is key to managing the EAB problem. In the years since it was first identified in Michigan in 2002, scientists have learned that the beetle may be present in an area for some years before its eventual discovery, by which point it has already moved to new areas. The focus now is not on directly eradicating the hard-to-detect pest, but minimizing the damage it causes. While some researchers are searching for genes that make North American ash trees resistant to EAB infestation, others, like the team at Iowa State, are exploring how existing tree and wood handling facilities and agencies might respond to growing demands for ash tree protection, diagnosis or removal.

Tyndall and co-PIs Randall and Knoot mapped out current partnerships among members of the EAB Readiness Team, as well as community networks in three cities in eastern Iowa, which in 2011 were at the western edge of the invasive beetle's

range. They interviewed members of the EAB Readiness Team and studied various iterations of Iowa's EAB Readiness Plan. This frequently updated "living" document outlined both proactive and reactive policy and procedures to combat the spread of EAB through the state. The research team also mapped a social network linking all the team members to each other based on frequency and direction of communication.

They discovered that while Iowa's EAB team was "in a relatively good

position compared to other states" to respond the invasive pest, there were limitations to how efficiently they could operate. Power differentials between team members meant that central players shared information more frequently than those in the periphery. The trust issues resulting from these communication imbalances stand in the way of effective co-management of the EAB problem.

The researchers also found that more funding would support the EAB team in duties ranging from tree diagnosis,

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WEB EXTRA
More about the history
of EAB destruction:
[www.leopold.iastate.edu/
fall-2014-EAB](http://www.leopold.iastate.edu/fall-2014-EAB)

treatment and removal, to public awareness campaigns about tree health, pest vigilance and responsible wood management. They noted that the creation of a dedicated state-level "EAB coordinator" position could potentially increase the team's long-term productivity in combatting not just EAB, but other emerging forest pests and pathogens.

In addition to agency- and policy-level analysis, the researchers looked at community-level responsiveness to the challenges posed by EAB. They mapped out stakeholder networks in the cities of Dubuque, Burlington and Iowa City, including private and public foresters, arborists, nurseries, landscapers, wood processors and others involved in plant materials management. They found that EAB is expected to have some positive impact on tree service or wood processing businesses, but that it also would put financial, technical and labor strains on many of the stakeholders. EAB predation places significant current and future demands on businesses to seek out collaborators to remove lumber, plant new trees or seek information on insecticide treatments.

EAB damage to ash trees has wide-ranging ecological, social and economic repercussions. The death of millions of ash trees across North America has created vast gaps in already fragmented forest ecosystems. In urban areas, billions of dollars are spent to monitor and treat potentially infested trees, as well as cut down and dispose of damaged or dead wood. The trees also provide non-monetary benefits such as shade, storm water retention, habitat and recreation.

"More than 60 percent of the farm and non-farm population in Iowa live in rural towns and larger cities," says Randall, the research team's Extension specialist. "The trees and other natural areas here already are at risk from farmland and urban development."

He notes that at least one urban forester believes there's a lesson to be learned from the battle with EAB: "It will spur public awareness to issues surrounding the importance of urban trees and tree management."



An adult emerald ash borer
(photo by Marianne Prue, Ohio
DNR—Forestry, Bugwood.org)

Aldo Leopold's land ethic rooted in Burlington

By LAURA MILLER, Newsletter editor

Much has been written about Aldo Leopold—respected conservationist, father of wildlife management, and visionary founder of the American wilderness system. But what do we know about young Aldo Leopold and his upbringing?

Steve Brower, a landscape architect from Burlington, has spent the last decade researching Aldo's early life in this Mississippi River town. He believes that Leopold's uncommon childhood, combined with hours spent tramping the river's wooded bluffs and backwaters, helped shape the land ethic that Leopold developed later in life.

Leopold was born in Burlington in 1887, the oldest child of Carl and Clara Leopold. The family lived with Clara's parents, who were prominent in the community. Aldo's maternal grandfather, Charles Starker, was a German-trained architect and landscape engineer, who settled in Burlington in 1850. He helped build many of the city's parks, the opera house, college, railroad lines and other landmarks such as the Snake Alley path to downtown Burlington.

About 15 years before Aldo was born, Starker purchased a three-story Italianate house and three-acre lot on Prospect Hill overlooking the river. Unlike the formal landscaping of the day, the home had a naturalistic setting with red and white oaks, wildflowers and European larches as reminders of home. Starker and the Leopolds maintained the bluff vegetation and cut "windows" in the trees to frame views of the river.

"Their yard became known as a bird's paradise," Brower said. "Starker called this his Lug-ins-land, or 'looking to the land'."

Young Aldo was an avid bird-watcher and kept meticulous field notes and drawings. At age 11, he wrote, "I like wrens best of all," having counted 13 nests that hatched 120 fledglings.

The family spent summers at the Les Cheneaux Islands on Lake Huron in Michigan. The Starkers also were early members of the Crystal Lake Club in nearby Henderson County, Illinois, that included natural wetlands along the Mississippi. The private club still is in operation.

Aldo's education combined both science and the humanities. In addition to school, his parents and especially his mother, helped stimulate his imagination by connecting the humanities to nature,

using art, music, literature, gardening and practical agriculture as ways to help him understand his environment.

Young Aldo was encouraged to write about his experiences, especially the day-long hikes he would take by himself in natural areas around his home. It was a habit he would continue while attending prep school in Lawrenceville, New Jersey and at Yale in New Haven, Connecticut.

Leopold writes in 1905, his first spring away from home: "Papa, I hope you & Carl will enjoy many of these spring days over in the swamps, just seeing things. There is so much to see and appreciate out of doors. Tell Carl to lay in a good stock of these trips around our locality, so that he can live them over again when he goes away."

Brower said Leopold's education reflected a European philosophy and pastoral view of the land, using nature as a source of renewal. Growing from these connections to nature were new values of less materialism, moving away from the Victorian-era emphasis on wealth. Leopold wrote about this conflict and loss in his essay, "Great Possessions."

In fact, Brower believes that many essays in Leopold's 1949 book, *A Sand County Almanac*, reflect on Leopold's childhood, loss and renewal.

"The fundamental connection between the human spirit and landscape took a lifetime for Aldo Leopold to unravel and explain," he said, resulting in a philosophy known as the Land Ethic. Leopold writes: "When we see the land as a community to which we belong, we may begin to use it with love and respect."



View of Leopold's boyhood home at 111 Clay Street in Burlington

Brower is a member of the Leopold Heritage Group, an organization formed in 2004 to advance Leopold's conservation philosophy.

The group is raising funds to purchase Leopold's boyhood home at 111 Clay Street, which the Starkers built in 1890 for Carl and Clara's growing family. The property has been on the National Register of Historic Places since 1981.

The group also has been working with parents and teachers at Aldo Leopold Middle School in Burlington to design a two-acre outdoor prairie classroom. The plan includes winding paths leading through reconstructed prairie to rock outcrop enclosures for classrooms.

Brower said he hopes their efforts will lead to a landscape-scale partnership that will help landowners adopt 'land health' practices and restore wildlife habitat.

"The Burlington area could become a center, along with Wisconsin and the Southwest, for the celebration of Leopold's ideas—connecting working landscapes and wild land recovery," he said.

Brower presented a program on Leopold's youth at Iowa State University in June. He's also available to talk about the importance of "the wild" for children. The Burlington house and landscape-scale partnership project offer other opportunities to get involved with Leopold activities (the group is kicking off a fundraising campaign this fall). For more information about all programs of the Leopold Heritage Group, contact Brower at brower406@aol.com.

 www.leopold.iastate.edu

More about Aldo Leopold:
www.leopold.iastate.edu/about/leopold

Leopold Heritage Group:
www.leopoldheritage.org

Celebrating an anniversary

2014 marks the 50th anniversary of the National Wilderness Preservation Act that protects nearly 110 million acres of U.S. public wildlands. Key to this landmark legislation was Leopold's 1922 proposal for Gila Wilderness in New Mexico (the first designated wilderness area in the world), and work by the Wilderness Society, that Leopold helped form in 1935.

This team's assignment: Help improve Iowa's local food system

By LAURA MILLER, Newsletter editor

People flocked to farmers markets this summer, chefs continue to feature locally-sourced ingredients on their menus, and more growers are offering CSA subscriptions for weekly boxes of produce.

These activities comprise just the tip of the iceberg in a local food system. Farmers markets and CSA farms represent direct sales to consumers, and many restaurants buy directly from farmers. Hidden below the surface are intermediary markets—representing 90 percent of all food sales—to grocery stores, restaurants and other institutions such as schools and hospitals. Add the processing and distribution part of the supply chain and you get an idea of what's involved in building a local food system that benefits Iowa agriculture and consumers.

Immersed in this complex world is Craig Chase, who leads local food programs for the Leopold Center's Marketing and Food Systems Initiative, Iowa State University Extension and Outreach, and the state-funded Local Food and Farm Initiative. His task is to determine how to support local food systems of all kinds in Iowa.

"You have to build local food systems from the ground up, they have to be community-based and community-driven," he explained. "A local food system in Decorah is not going to look like a local food system in Des Moines because it's what people in those communities want their food system to look like."

Chase said the approach that's being taken in Iowa is to gather a diverse group of people—from the business, faith, governmental, farming and educational communities—to talk about their food system. Together the group sets common goals and a vision of what they want to see happen in their community. Unlike efforts that focus on encouraging the consumer to buy more locally grown products, this approach draws in the entire community, which adds to the sustainability of the new enterprises and efforts that follow.

The grassroots approach can lead to surprising and creative projects.

"All of a sudden people see where they fit in and how they can contribute," Chase said. "In Des Moines, the South Side YMCA

wants an orchard, Easter Seals wants a farm for their clients and the Des Moines Social Club is looking at an aquaculture project. It's all about connections."

He said similar networks are forming in Cedar Rapids. The Horizons Alliance service agency wants more local food for meals delivered to low-income residents and another nonprofit, Matthew 25, hopes to launch an incubator farm that will be harvesting fruit and vegetable crops. The connecting piece could be a food enterprise center, under study by third group, to process and distribute local food products in Johnson and Linn counties.

A second focus for the local food program is to provide resources about some of the projects that communities might choose to pursue, what Chase calls "pieces of the food system puzzle." This includes processing centers and shared-use kitchens, food hubs that aggregate and distribute food, and incubator farms to train beginning farmers. Team members are gathering information about what has and has not worked in these operations elsewhere, to inform Iowa communities as new projects are considered.

"Food hubs are very popular and a piece of the puzzle that's been missing that can provide a lot of people access to local foods," Chase said. "Our job is to make sure that the people who decide to do this go into it with their eyes wide open. It's the role for any land grant university, to provide educational resources, tools and technical assistance, so that people can make informed decisions."

Chase has assembled a team that is working on local food system resources in these areas.

Food hubs

Iowa has six food hubs, according to the USDA, but only two aggregate produce from farmers to sell into institutional markets: the Iowa Food Hub in Decorah and GROWN Locally in Clermont. Others are being explored for Cedar Rapids, Mason City, Davenport and Sioux City. Leopold



Craig Chase

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Find these resources by title:

- *Production Planning for Aggregators*
- *Local Food System Toolkit 1: Developing a Worksite Food Box Program*
- *Shared-use Kitchen Planning Toolkit*

www.leopold.iastate.edu/pubs/alpha

Center graduate student Savanna Lyons is interviewing 12 food hubs nationally, with a focus on financial information needs. Two resources related to her work are available: *Production Planning for Aggregators* and *Local Food System Toolkit 1: Developing a Worksite Food Box Program*.

Shared-use kitchens

These are licensed facilities where foods are processed for resale. Leopold Center program assistant Alice Topaloff said no shared-use kitchens operate in Iowa but she is aware of interest in setting up such facilities in Des Moines, Davenport, Cedar Rapids, Decorah, Cedar Falls and southwest Iowa. These facilities boost local economies by either offering another market for farmers to process excess produce for winter sale, or creating jobs for others in the community.

Incubator farms

These are multi-year programs where participants work on a farm and transition to their own land while learning horticultural, business and marketing skills. Iowa only has one such program, Global Greens that is operated



Five Karen women from Burma collect product from their community garden plots at Global Greens Farm in West Des Moines (photo by Nicholas Wuertz).

continued on page 11

for refugees in Des Moines by Lutheran Services in Iowa (and supported by a MFSI competitive grant). Topaloff, who is researching incubator farms nationally, said there's interest in setting up incubator farms in Waterloo, Marshalltown and Cedar Rapids.

Urban agriculture

Courtney Long is a regional planner who balances her time between a 30 percent Leopold Center appointment and the ISU Community Design Lab. She is working with three communities—Des Moines, Cedar Rapids and Cresco—to identify food system resources and needs for an “agricultural urbanism toolkit.” The project will help raise awareness of and access to local food production and support organizations in planning school gardens, food hubs, community farms, edible landscaping and related work.

Partnership development, planning

Also helping in this community enhancement process is Lynn Heuss, who is assistant coordinator of the Local Food and Farm Initiative (LFFI) in Iowa. She helps communities determine what kind of information and processes they need, and links people with resources. Working with her is graduate student Ahna Kruzic. She is researching common characteristics of communities that have strong local food system, and exploring how the community planning process can be improved.

Evaluation

Leopold Center evaluators Corry Bregendahl and Arlene Enderton also are part of the local foods team. Chase says: “We are evaluating everything we do because we want to know that we’re providing the education and technical assistance that communities want and need.”



Courtney Long from the ISU Community Design Lab leads activities for Carver Elementary School students and their families to help plan a school garden. Long is working in the Des Moines, Cedar Rapids and Cresco communities to prepare an agricultural urbanism toolkit as part of a Leopold Center research grant (photo by Community Design Lab).

Why local, why now?

Four short videos from the Leopold Center and Iowa State University Extension and Outreach showcase the importance of local food production. “Why Local? Why Now?” explores some of the reasons behind investment in regional and local food systems including rural economic development, creating jobs and other opportunities for young people interested in agriculture, and connecting kids to fresh, nutritious food to promote lifelong health.

Local food products may have other advantages in Iowa and the Midwest because of the way they produced – on small farms that grow a variety of crops. Crop rotations improve soil quality and multiple crops can spread risk across several enterprises. Local food production also can increase food security and access in rural communities that may not have a grocery store.

Find the videos on the Leopold Center's new YouTube channel: www.youtube.com/user/LeopoldCenter.

MarketMaker connects food businesses to local, national markets

When the University of Illinois Extension first launched the MarketMaker website in 2004, it was a state-level program based in Illinois. Developers Rich and Darlene Knipe had no idea that within a decade, MarketMaker would be a nationwide program on its way to an international presence.

MarketMaker is an online database that lists food businesses—such as farms, restaurants and grocers—and georeferences them on a digital map that includes the owners' contact information. The program also maps market research information from U.S. Census data, allowing producers to identify the census tracts in their area with the most demand for their products.

A competitive grant from the Leopold Center helped expand the program from Illinois to Iowa, which has given over 15,000 Iowa businesses the opportunity to connect with one another and with new markets for their products.

Nineteen states and the District of Columbia already have signed on to use MarketMaker, which soon will be established in the rest of the United States. India also is in the process of adopting

 www.leopold.iastate.edu

Iowa MarketMaker:
www.marketmakeriowa.com

More about this program:
www.leopold.iastate.edu/success-marketmaker

MarketMaker, which will launch the program into the global sphere.

In addition to the food industry database it started with, MarketMaker recently has added a classifieds section where users can list items for sale, items they are looking to buy, services offered and transportation needs. Iowa's MarketMaker website is unique in that it also allows users to post industry job opportunities, which are automatically listed on the Iowa Workforce Development and USA Jobs websites as well.

“Whether it's someone in Iowa looking for a market in New York or a restaurant looking for Berkshire pork for a white tablecloth restaurant, we're kind of like a dating service introducing people,” says Craig Tordsen of Iowa State University Extension and Outreach's Value Added Agriculture Program. Tordsen was instrumental in bringing the program to Iowa.



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Pesek-Pierre Colloquium

September 30 • ISU Memorial Union, Ames

The Pesek Colloquium on Sustainable Agriculture, the Pierre Soil Science Lecture, and the Science Communication Project at ISU will be collaborating to explore the craft and discipline of science communication – with a focus on sustainable agriculture and soil science.

Filmmaker Deborah Koons Garcia and soil scientist Kate Scow will present “Communicating Science through Stories in Film? A Dialogue about Agricultural Sustainability and Soil.” Garcia’s documentary, *Symphony of the Soil*, will be screened on September 29. Scow is a professor at the University of California Davis, where she also directs the Russell Ranch Sustainable Agriculture Facility.

Women, Food and Agriculture Network

November 14-15 • Fairfield

The conference theme is “Women Doing Democracy: Building Grassroots Coalitions to Grow Healthy Food and Farming in Your Community.” Keynote speakers include the director of Black Urban Growers in New York and Diane Rosenberg of Jefferson County Farmers and Neighbors. This event is supported by a Competitive Educational Support Program grant from the Leopold Center.

14th Annual Iowa Organic Conference

November 16-17 • Iowa City

Keynote speaker will be Mary Berry, daughter of novelist and farmer Wendell Berry. She directs the Berry Center in New Castle, Kentucky, advocating for small farmers, agriculture of the middle, and the hope of restoring a culture that has been lost in rural America. More than 300 people involved in organic agriculture are expected to attend this event, which will be held in the Memorial Union at the University of Iowa.



Agroforestry economics

Hazelnut shrubs surround those who attended the Second Agroforestry Academy, a four-day “train the trainers” workshop in Winona organized by the Mid-American Agroforestry Working Group.

Jason Fishbach (right), University of Wisconsin Extension, talks about processing a hazelnut crop.